

Consumer's Guide to GM Rice and Other Grains

By Alex Jack

"Genetically modified means an organism in which the genetic material has been changed through gene technology in a way that does not occur naturally by multiplication and/or any natural recombination."—United Nations, 2000

Scores of genetically modified foods and products have been introduced around the world. For a comprehensive list of products that have been approved in the United States, please see *Imagine a World Without Monarch Butterflies* by Alex Jack (One Peaceful World Press, 2000). This section deals primarily with GE grains in development or grain products currently on the market that contain GE ingredients.

Countries Producing GE Foods

At the present time, the following countries are growing or producing GE foods and products:

- United States (50+ foods in total)
- Canada (30 foods)
- Japan (22 varieties of 6 crops)
- European Union, especially Spain and France (9 foods)
- Argentina (3 foods)
- Mexico (3 foods)
- Australia (2 crops + 6 field trials)
- Brazil (1 food)
- South Africa (1 food)
- China (1 crop)
- Russia (1 crop)

- India (1 crop)
- Vietnam (1 crop)

Countries Developing GE Rice

- United States
- China
- Japan
- Korea
- Philippines
- Switzerland
- Mexico
- Australia
- Italy

Countries Limiting GE Foods

Countries with labeling laws, restrictive agriculture, environmental, or import policies, or prohibitions:

- Australia
- Austria
- Brazil (attempted ban)
- Denmark
- Ethiopia
- France
- Germany

- Greece
- Italy
- Luxembourg
- Japan
- Korea
- Mexico
- Namibia (banned)
- New Zealand
- Norway (banned)
- Russia
- Saudi Arabia (banned)
- Sri Lanka (banned)
- Switzerland
- Taiwan
- Tasmania (banned)
- Thailand
- Uganda (banned)
- United Kingdom
- Wales (banned)

Major Biotech Companies

- Aventis (French company combining Hoechst and Rhone Poulenc)

- Monsanto (U.S. company, subsidiary of Pharmacia and Upjohn)
- DuPont (U.S. company operating under Pioneer Hybrid division)
- Syngenta (Pending merger of Novartis and AstraZeneca in Europe)
- Dow Chemical (U.S. company)

Rice Species

- Indica (*Oryza sativa*, grown in South Asia, Southeast Asia, Southern United States)
- Japonica (*Oryza sativa*, grown in the Far East, California)
- Africana (*Oryza glaberrima*, grown in Africa)
- Javonica (*Oryza sativa*, grown in Indonesia)

Rice Varieties

- Short grain
- Medium grain
- Long grain
- Sweet rice
- Basmati rice, jasmine rice, etc.

Rice Products

Rice is hulled, milled, or processed in a variety of ways. The main types of rice and rice products available include:

- Whole grain rice (brown rice, unpolished rice, unhulled rice)
- White rice (polished rice, converted rice, parboiled rice)
- Amasake (sweet rice beverage)

- Rice cakes
- Rice syrup
- Rice milk
- Mochi (pounded sweet rice)
- Rice miso (soybean paste with rice)
- Rice noodles
- Rice balls
- Sushi
- Rice crackers
- Puffed rice
- Rice dumplings
- Rice croquettes
- Rice cream
- Rice porridge
- Rice pilaf
- Rice bread
- Rice flour
- Rice flakes
- Rice bran
- Rice cookies
- Rice salad
- Rice pudding
- Rice custard

- Rice vinegar
- Rice bran oil
- Rice tea
- Beer
- Sake (rice wine)

GE Rice Research and Development

Several dozen varieties of GE rice are under development or being field tested. Between 1982 and 1997, 160 patents were granted or pending. In 2001, the mapping of the rice genome was completed, spurring further GE development. Major GE rice developers and the traits they are modifying include:

- AgrEvo (male sterility)
- American Cyanamid (herbicide resistance)
- AstraZeneca (beta-carotene content)
- Aventis (herbicide resistance)
- Catholic University of Piacenza (insect resistance)
- Chinese government (insect resistance)
- Chonnam National University, Korea (higher yields)
- Du Pont (protein content)
- Institute of Genetics, Berlin (starch content)
- Institute of Plant Sciences, Zurich (beta-carotene content)
- International Rice Research Institute (beta-carotene content)
- Japan Tobacco (altered photosynthesis/flowering)
- Kubota (yield increase, protein content)
- Louisiana State University (bacterial resistance)

- Misubishi (viral resistance)
- Mitsui (yield increase, starch content)
- Monsanto (herbicide tolerance)
- Novartis (herbicide tolerance)
- Pioneer Hi-Bred (pest resistance and fungal resistance)
- Rockefeller Foundation (enhanced nutrition)
- Science University of Tokyo (hepatitis vaccine)
- University of California (bacterial resistance)
- Washington State University (bigger grains)
- West Africa Rice Development Association (higher yields)

GE Rice and Rice Products

The first rice designed for commercial production developed with the help of GE selection methods was approved by the U.S.D.A. in late 2000. GE varieties under development include:

- Cadet and Jacinto (U.S.D.A., Agricultural Research Service, Beaumont, Texas, improved cooked rice texture developed with the help of biotech selection methods and bred with conventional methods)
- IMI Rice Seed (American Cyanamid, herbicide-resistance)
- Liberty Link Rice (AgrEvo and Louisiana State University, herbicide-resistance)
- Roundup-Ready Rice (Monsanto, herbicide-resistance)

GE Wheat and Wheat Products

In early 2001, Monsanto launched the first field trials of Roundup Ready spring wheat in North Dakota, South Dakota, Minnesota, and Montana. Like its altered corn and

soybeans, GE wheat is designed to be resistant to the herbicide, Roundup. Scientists at Oregon State University, Washington State University, University of South Dakota, and University of Minnesota are engaged in the effort. Commercial production would begin in 2003, and red winter wheat and other varieties would follow.

U.S. Wheat Associates, the major trade organization, has declined to take any action in support of GE wheat. But it has called for systems to prevent the commingling of GE wheat with conventional varieties if it is introduced. On general issues related to biotechnology, the Wheat Associates' board endorsed voluntary food labeling of GE ingredients and supported the consumer's right to know and the food industry's right to inform.

In Canada, which is a major wheat producer, Canadian Wheat Board CEO Greg Arason stated, "No transgenic varieties should be registered for commercial production in Canada until either they have achieved full commercial acceptance in all their potential markets, or until we have cost effective technologies to segregate by variety throughout the system." Arason called for the freeze on the registration of new transgenic crops at a meeting of the Canada Grains Council.

Although GE wheat is not available, it is being grown on test plots, and in 1999 Thailand reported that a shipment of wheat from the Pacific Northwest was contaminated with experimental GE wheat.

Many common wheat products, however, may contain other GE ingredients, especially altered canola oil, cottonseed oil, or peanut oil. Yeasted bread, especially that made with white flour, may contain GE enzymes.

GE Enzymes Used in Wheat Products

- Alpha Amylase (cereals, beer, and other foods)
- Hemicellulase (bread flour)
- Lipase and Triacylglycerol (baked goods)
- Novamyl (bread and baked goods)
- Pullulanase (high fructose corn syrup)

Wheat Products That May Contain GE Enzymes

- Bread
- Crackers
- Cookies
- Bagels
- Doughnuts
- Cakes
- Pies
- Pastries

GE Corn and Corn Products

Corn is the only genetically engineered grain currently on the world market. An estimated 25% of the U.S. corn crop, including corn for both animal feed and human consumption, was modified in 2000. (This is down from a high of 35% in 1999.) The major type of GE corn contains Bt, a bacterium that releases a toxic protein that is designed to kill the corn borer and other pests. However, the plant's pollen can endanger beneficial insects, birds, and other animals as well. In experiments, Cornell University scientists reported that pollen from GE corn that drifted to adjacent milkweed plants killed 44% of the larvae of Monarch butterflies within several days. Many processed food products in the supermarket and natural foods store contain corn syrup, cornstarch, corn dextrose, corn oil, corn flour, or other corn product that may be genetically altered. Ninety percent of the corn crop is fed to livestock to produce animal foods.

GE Corn and Corn Products

- Fresh corn
- Popcorn
- Corn tortillas
- Grits
- Polenta

- Masa (corn dough)
- Corn syrup
- Corn fructose
- Corn starch
- Corn dextrose
- Corn oil
- Corn flour
- Cornmeal
- Other corn products

Processed Foods and Products That May Contain GE Corn

- Corn Chips
- Cookies, Candies, and Gum
- Bread
- Cereals
- Pickles
- Margarine
- Beer and Alcohol
- Soft Drinks, Spritzers, Fruit Drinks
- Enriched Flours and Pastas
- Salad Dressings
- Vanilla
- Infant Formula

- Vitamin C tablets

Products Produced from Animals Fed GE Corn and Soy

- Beef, including hamburger, steak, etc.
- Pork, ham, hot dogs
- Lamb
- Chicken, eggs, turkey, and other poultry
- Factory-fed trout, salmon, and other fish

GE Barley and Barley Products

Australia, the United Kingdom, and several other countries are experimenting with GE barley. However, none is commercially available yet. The malting barley industry, which manufactures beer, reportedly will not accept GE malting barley in any country except China.

Selected Companies Using GE Ingredients in Grain Products

- Aunt Jemima (pancake and waffle mixes)
- Beechnut (baby foods)
- Betty Crocker (pie and pancake mixes)
- Bisquick (mixes)
- Campbell's (corn chowder, chicken rice, chicken noodle soup)
- Celeste (pizza)
- Delicious (cookies)
- Duncan Hines (mixes)
- Frookies (cookies)

- General Mills (Cheerios, Wheaties, breakfast cereals)
- Green Giant (harvest burger)
- Keebler (cookies)
- Kellogg's (corn flakes, fruit and grain bars)
- Kraft (tacos, corn products)
- Morningstar (vegetarian burgers)
- Nabisco (fruit and grain bars, Oreo cookies)
- Nature Valley (granola bars)
- Old El Paso (taco shells)
- Pepperidge Farms (breads, baked goods, corn chowder)
- Pillsbury (bread and muffin mixes)
- Post (breakfast cereals)
- Quaker Oats (breakfast cereals)
- Sesame Street (cookies)
- Thomas's (English muffins)
- Tombstone (pizza)
- Wonder (bread)

Selected Companies Not Using GE Ingredients in Grain Products

- A. C. LaRocco (pizza)
- Amy's Kitchen (pizza)
- Arrowhead Mills (breakfast cereals)
- Barbara's Bakeries (breakfast cereals, cookies)

- Bearitos (corn chips, natural foods)
- Earth First (breakfast cereals, natural foods)
- Earth's Best (baby foods)
- Eden Foods (rice and soymilk, pastas, and other products)
- EnviroKidz (natural foods)
- Erewhon (rice crispies and other products)
- French Meadows (bread)
- Frito-Lay (corn chips)
- Garden of Eatin (blue corn chips)
- Gelentano (frozen vegetable lasagna)
- Genuardi's (brand name supermarket products)
- Gerber's (baby foods)
- Health Valley (granola bars, cookies)
- Heinz (baby foods)
- Kirin and Sapporo (corn-based beer imported from Japan)
- Lifestream (breakfast cereals, natural foods)
- Lundberg Farms (brown rice, rice cakes, rice syrup)
- Manna (bread)
- McDonald's, Burger King, and Procter & Gamble (just french fries)
- Millina's Finest (pasta)
- Nature's Path (cereals)
- New Pioneer Co-op (bread)
- Novartis (Ovaltine, Gerbers, Wasa crackers, health food lines)

- Pamela's (cookies)
- Seagram (corn-based liquor)
- Shiloh Farm (bread)
- Turtle Island (grain tempeh)
- Vita Spelt (spelt)
- White Wave (grain tempeh)
- Whole Foods (brand name natural supermarket products)
- Wild Oats (brand name natural supermarket products)

GE-Free Seeds

Fifty seed companies around the country have joined in a Safe Seed Initiative, pledging "not to knowingly buy or sell GE seeds or plants." These include:

- Abundant Life Seed Foundation
- Alberta Nurseries & Seeds
- Heirloom Seed Project
- Heirloom Seeds
- Johnny's Selected Seeds
- KUSA Seed Research Foundation
- New England Seed Co.
- Prairie Garden Seeds
- Seed Savers Exchange
- Seeds for the South
- Seeds of Change

- Thomas Jefferson Center for Historic Plants

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